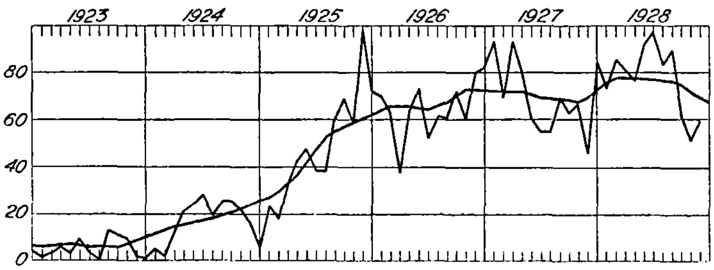
SMOOTHED MONTHLY MEANS OF SUN-SPOT RELATIVE NUMBERS, 1920–1929, INCLUSIVE [1]

[Furnished through the courtesy of Prof. W. Brunner, who made the observations and computations]

[*Federal Astronomical Observatory, Zurich, Switzerland, January, 30, 1930*]

Year	January	February	March	April	May	June	July	August	September	October	November	December	Annual
1920	46.8	43.2	40.3	39.4	38.7	37.9	36.8	34.9	32.1	31.0	31.3	30.6	36.9
1921	31.0	31.7	31.1	29.0	27.3	26.5	25.3	24.4	25.5	25.8	24.3	22.5	27.0
1922	20.1	18.1	16.9	15.8	14.9	14.4	13.9	12.6	9.4	7.1	6.7	6.6	13.0
1923	6.4	5.9	6.0	6.6	6.9	6.4	5.6	5.6	5.7	5.8	6.8	8.1	6.3
1924	9.8	11.6	12.9	14.0	15.1	16.1	16.9	17.9	19.3	20.9	22.6	24.5	16.8
1925	25.9	27.1	29.3	32.6	35.9	40.9	47.2	51.8	55.6	57.7	58.9	60.9	43.7
1926	62.6	64.1	65.1	65.2	65.4	64.7	64.3	65.7	66.9	69.5	72.4	72.4	66.5
1927	72.0	71.8	71.7	71.7	71.6	70.5	69.1	68.4	68.3	68.4	67.7	69.0	70.0
1928	72.1	75.1	77.3	78.1	77.3	77.2	77.1	76.1	74.2	71.6	69.2	67.7	74.5
1929	66.2	64.3	61.3	58.6	59.6	63.0	64.8	64.0	62.8	61.1	60.6	57.5	62.0



SAN FRANCISCO FORECAST CENTER ADOPTS NEW BASE CHART

On January 29 the San Francisco district forecast center adopted a new base chart for use in charting weather reports received twice daily at that forecast center.

The new chart covers the Pacific Ocean from about the one hundred and eightieth meridian of west longitude eastward to and across the North American Continent to the Atlantic Ocean and in a north-south direction from about the thirty-fifth parallel of north latitude to the Arctic Ocean. The use of this base chart marks a great improvement in the facilities for charting weather reports from the Pacific and for the Canadian Northwest, including Alaska.—*A. J. H.*

TORNADO IN WARREN COUNTY, N. C., JANUARY 5, 1931 [2]

By CLARENCE E. SKILLMAN

[Weather Bureau, Raleigh, N. C.]

The storm, described as a large funnel-shaped cloud with a heavy roaring sound, struck first at about 4.35 p. m. on the farm of Mr. J. W. Bishop, 3 miles west of Wise in the northwest part of the county. It destroyed a tobacco barn and packhouse and moved half a mile northeast to where Jim Dunston, colored, lived in a log cabin in a grove of large oak trees. In a course about 100 yards wide it uprooted or twisted off practically every tree in the yard and destroyed completely the house and all outbuildings, killing Jim Dunston and three children outright, one son, 23 years old, dying next day in a hospital. A mile further on it dipped down to destroy a stable and two barns.

Three miles to the northeast, with occasional signs between, it struck in the neighborhood of the Warren County Training School for colored children. Here it struck Locust Grove colored church at the right side of its path, moving it 50 feet north and wrecking it. The colored Christian Church on the left of the path was blown away entirely, except for the floor and foundation. The roof is nowhere to be seen.

At the school there were several frame buildings grouped around a large frame 2-story building in the center. One building on the right, or southeast, side was not materially injured. The main building, directly in the path of the storm, evidently too substantial to be torn down, was moved north off its foundation and twisted beyond repair. Part of the roof on the south side was torn off. A girls' dormitory at the rear of the main building was wrecked, leaving only the floor and part of the partitions standing. About 20 girls were in this building at the time, most of them remaining there. Of those who ran out into the storm, one was struck and killed by a flying piece of timber and another, a teacher, sustained two broken ribs. None of those in the building were injured. A garage and implement shelter in the same line were demolished and the machinery damaged. A large poultry yard lying partly in the path of the storm was about half destroyed and 75 hens were taken up and carried several hundred yards and found dead. Another building at the left was only slightly injured. The top of a large pine standing at the right side of the path of the storm was broken off about 50 feet from the ground and carried 70 yards north and driven 10 feet into the corner of the main frame building.

In all, six people were killed and the property loss is estimated at $35,000.

PERIODIC OSCILLATIONS OF TEMPERATURE

By the late DR. C. EASTON

[Scheveningen, Netherlands]

[Meteorologische Zeitschrift, 1929, p. 171]

Relative to the interesting work of A. Wagner on the yearly oscillation of temperature in Europe in the last decades (Meteorologische Zeitschrift, 45 p. 364), I should like to make the following remarks:

Prof. A. Wagner finds that "the frequency * * * of mild winters in middle Europe in the last decades is such a striking phenomenon that it has been noticed not only by meteorologists, but also by everyone in the uninitiated class who experienced the severe winters at the close of the preceding century." The winters of 1917 (1916–17), 1922, and 1924, however, were certainly not mild; the first-named even ranks with severe winters and it would probably be better to take into consideration only the decade 1906–1916. Prof. A. Wagner compares the years 1886–1895 with the years 1911–1920, that is, the periods in which the temperature oscillation was greatest and least, respectively. As it appears to me, Prof. A. Wagner correctly concludes from his studies that one does not arrive at an explanation of this peculiarity through any secondary cause whatever; he believes that it is rather to be referred to a strengthening of the general circulation "now continuing for decades."

---

[1] For summary of preceding years, see MONTHLY WEATHER REVIEW, August, 1920, vol. 48, p. 460.

[2] At 8 a. m. seventy-fifth meridian time January 5, 1931, a cyclonic storm was centered over southeastern Tennessee with central pressure down to 29.30 inches; in the next few hours it moved almost due northeast and its center must have passed on the left of Warren County at a probable distance of 50 to 75 miles. Tornadoes in January, although not unknown, are unusual.—*Editor.*

Recent epochs of maximum and minimum: Minimum, 1913.6, 1923.6; maximum, 1917.6, and probably about the middle of 1928.

It is very worthy of note that diminished yearly amplitude of temperature in Europe, as Prof. A. Wagner determines it for the next to the last decade, is manifest at intervals of 89 years in the historic data on winter weather. With diminished yearly oscillation there is associated a decided decrease in the frequency of very severe winters and, often, a high frequency of mild winters.

The last-named phenomenon was very evident in the next to the last decade; the winters of 1910, 1911, 1912(?), 1913(?), 1914, 1915, and 1916(?) showed a mean temperature in excess of the normal, that is, at least for western Europe.[1] This feature is so decided that in Petermann's Mitteilungen (1905, Heft 8) I ventured to predict that "there appears certainly warranted the inference of a period of extraordinarily few cold winters, at whose beginning we probably find ourselves at this time (1905)."

That earlier investigation, which was based on historical data relative to severe winters in western and middle Europe—mainly in the Alpine region and its vicinity [2]—collected by Wilhelm Köppen, drew attention to the presence of one or more rather long periods that were to be considered as multiple lengths of the well-known sun-spot period of approximately 11 years and that came to light both in the activity of the sun and in the oscillations of winter temperature in Europe; an 89-year period (8 by 11⅛ years) had been pointed out most plainly, especially in a very rare occurrence of severe winters toward the end of this long period.[3]

The historical material was much improved by myself through the addition of data on mild winters and by the limitation of the lines of argument to the climatic province of western Europe. (See, among other references, Peterm. Mitt., LXIII, 1917 and, especially, Les Hivers Dans l'Europe Occidentale; Etude Statistique et Historique Sur Leur Température. Tableaux Comparatifs, Notices Historiques, et Bibliographie. Leyden. E. J. Brill. 1928.) From my last compilation I take the following Table 1. In it the period 1205–1916 is divided into eight 89-year periods, and each period is subdivided into divisions of 22, 23, 22, and 22 years; here only the last two parts are cited (C: 1250–1271, and D: 1272–1293, etc.). The number of very severe, severe, and cold winters is given for each subdivision (above), and the number of moderate and mild winters (below). For example, we find for 1272–1293 winters noted as follows: Very severe, 0; severe, 3; cold, 3; moderate, 0; and mild, 2.[4]

In this it is to be borne in mind (1) that the data relative to mild winters are always very indefinite and very often unreliable; and (2) that the period is certainly somewhat variable and therefore the rises and falls do not fit exactly into the mathematical limits here given; thus, for example, the winter of 1895 (1894–1895) belongs without doubt in the preceding subdivision C; for the present free choice is to be avoided only by a strict mathematical division.

TABLE 1.—*Frequency of cold and mild winters in 22-year periods*

C		D	
1250–1271	$\frac{0, 1, 5}{0, 4}$	1272–1293	$\frac{0, 3, 3}{0, 2}$
1339–1360	$\frac{0, 2, 5}{0, 1}$	1361–1382	$\frac{1, 3, 2}{3, 0}$
1428–1449	$\frac{1, 2, 1}{0, 3}$	1450–1471	$\frac{0, 3, 2}{0, 4}$
1517–1538	$\frac{0, 0, 4}{2, 5}$	1539–1560	$\frac{0, 3, 2}{0, 2}$
1606–1627	$\frac{2, 1. 4}{2, 3}$	1628–1649	$\frac{0, 0, 5}{0, 3}$
1695–1716	$\frac{1, 2, 3}{4, 5}$	1717–1738	$\frac{0, 1, 3}{1, 1}$
1784–1805	$\frac{3, 1, 3}{3, 4}$	1806–1827	$\frac{0, 2, 4}{2, 3}$
1873–1894	$\frac{2, 1, 4}{0, 4}$	1895–1916	$\frac{0, 1, 2}{1, 6}$

We see that in the last four, most authentic, periods (since 1606) a marked excess of very cold winters is constant in C. Taken together these last four 89-year periods show the following frequency of cold and mild winters (totals in parentheses):

In Table 2 there comes to view still more plainly the marked temperature oscillation in C and the moderate number of cold and very cold winters in D. (D gives the summation of the periods 1628–1649, 1717–1738, 1806–1827, and 1895–1916.)

It is, however, very evident that the simple summation of very cold and very mild winters without regard to the plus or minus departure must give a good picture of the greater or lesser temperature oscillation. We find for all eight periods since 1205:

TABLE 2.—*Frequency of cold and mild winters in four 89-year periods since 1561*

Subdivision A	$\frac{5, 10, 11 \ (26)}{4, 10 \ (14)}$	Subdivision C	$\frac{8, 5, 14 \ (27)}{9, 16 \ (25)}$
Subdivision B	$\frac{1, 9, 11 \ (21)}{2, 19 \ (21)}$	Subdivision D	$\frac{0, 4, 14 \ (18)}{4, 13 \ (17)}$

TABLE 3.—*Total number of winters that were very cold or very mild*

Subdivision	1205–1916	1561–1916
A	43	24
B	31	30
C	39	30
D	25	8

For convenience, Table 4 in the original text has been combined with Table 3.

The great amplitude in C and the moderate amplitude in D comes to view very plainly, especially in the best authenticated data (period 1561–1916).

It is also possible to determine on an absolute scale, and with rather good approximation, the intensity of the temperature oscillation in C and D by means of "tem-

[1] For the climatic region of western Europe I found the temperature coefficients 65, 57, 74, 77, 55, 65, 74 (normal=50). Details in my work, Les Hivers Dans l'Europe Occidentales. Leyden, 1928, p. 208.

[2] Wl. Köppen. Über merkwürdige Perioden der Witterung usw., Zeitschr. d. Österreich. Ges. f. Meteorol., Bd. XVI. 1881. After my work of the year 1917 was published Professor Köppen discovered an 89-year period in his material. Compare Ann. d. Hydr. u. marit. Meteorol., XXV, 11, 1917 and Meteorol. Zeitschr. XXXV, 3, 4.

[3] C. Easton. Zur Periodizität der solaren und klimatischen Schwankungen, Peterm. Mitt. 1905, Heft 8. Compare Versl. Kon. Akad. v. Wetensch. Amsterdam, Nov. 26, 1904, June 24, 1905.

[4] It is evident that the older data are less complete than the later. In addition the terms "severe" and "mild" are here determined scientifically and do not always agree with the popular understanding. For the elaboration of the historical data see Les Hivers, introduction and, especially, pp. 166 and 200.

perature coefficients" obtained by critical comparison of historic and modern data. (See Les Hivers, p. 10 ff.) The departures of the coefficients from the normal of 50 (as given on p. 200 of the work mentioned) are found totaled in Table 4.[1]

Relative to the last result, 247 and 203, see remark on the winter of 1895.

TABLE 4.—*Totals of the departures of the temperature coefficients*

C		D	
1606-1627	306	1628-1649	138
1695-1716	388	1717-1738	135
1784-1805	336	1806-1827	222
1873-1894	247	1895-1916	203

The above table is numbered 5 in the original text.

These statistical data appear to indicate the correctness of the conclusion that the very remarkable phenomenon pointed out by Prof. A. Wagner is to be referred to a long-period oscillation coming to light for centuries in the historical data on winter temperatures. It was shown at an earlier date [2] that this 89-year periodicity agrees with—and is thus caused by—an oscillation in solar activity, both in the changing size of the spotted part of the sun's sufrace and also in the variable duration of the period of time between a minimum and the following maximum; the agreement becomes apparent also from the coincidence of an unusual cold wave at the close of the eighteenth century with an accelerated and intensified sunspot activity [3] at the same time. In conclusion I should like to add that I consider this 89-year periodicity not as a single period, but as a resonance or interference phenomenon at the coincidence of probably numerous independent periods, of which, however, no individual one has any considerable amplitude.

It would be interesting to test whether the 89-year oscillation comes more plainly into view in middle Eurpoe (as here for western Europe) in my newly revised data (Les hivers).—*Translated by W. W. Reed.*

COMMENTS ON THE INFLUENCE OF VEGETATION ON STREAMFLOW

By FRANCIS E. COBB, President and State Forester

[North Dakota School of Forestry, Bottineau, N. Dak., February 7, 1931]

I am much interested in the article [4] by Harry B. Humphrey and B. C. Kadel in regard to the influence of trees on stream discharge.

A small stream, Oak Creek, flows along the border of our campus, originating in springs located about 4 or 5 miles in the foothills of the Turtle Mountains. This is an intermittent creek and it is very common for this stream to discontinue flowing during the summer. In dry springs it may not flow after June. Sometimes it continues as late as August and occasionally runs throughout the year. However, it is commonly noticed that in the summer when it does not flow it always begins flowing as far down as we are located in the fall after the leaves have fallen from the trees. Sometimes it starts to flow even earlier than this. The article in question would lead me to believe that the growth of trees, which is quite heavy along its entire course to where we are located, have a great deal to do with the discontinuance of the flow during their growing period. It has often been wondered why after a dry summer it should begin in the fall even before the freezing of the ground, and this is apparently an explanation.

An article also in this same issue in regard to the passing of the mirage from the Weather Bureau at Dodge City, Kans., is also of interest.

We are a cooperative observer of the Weather Bureau at Bismarck and are naturally interested in all phenomena relative to weather conditions. Southeast of this town on clear, warm days during the entire summer a mirage lies, giving the appearance of a very large lake with tall trees on the banks and looks as though the farm houses in that section were entirely flooded, except for their upper stories This entire territory is in crop and apparently no difference appears whether the crop is growing or harvested.

I merely note this as a matter of interest inasmuch as here it does not depend on whether the prairie is bare or in crop.

ARCTIC WEATHER STATIONS

By C. F. TALMAN

Just as, in the Southern Hemisphere, an outpost for weather observations maintained by the Argentine Government at Laurie Island, in the subantarctic South Orkneys, is operated by a small party who spend a year in complete isolation—being then replaced by another party—so in the far north the Russian Government has a number of weather stations whose staffs are relieved annually. The most northerly is the one established in Franz Josef Land in 1929. These arctic stations, like the one at Laurie Island, are equipped with radio.

Last summer the ice breaker *Sedov* visited the station in Franz Josef Land, where the seven members of the staff were found in good health. They were replaced by a new staff of 10 men and 1 woman. The latter, the wife of the director, is to conduct biological investigations.

From Franz Josef Land the *Sedov* proceeded through ice fields to the archipelago north of the Taimyr Peninsula formerly known as Emperor Nicholas II Land but now called Severnaya Zemlya (Northern Land). Some previously unknown islands were discovered, including a group of small ones to which the name Kamenev Islands was given, and in one of these a new station was established, in latitude 79° 24′ north and longitude 91° 3′ east. Four men were left here, with provisions for three years.—*Why the Weather—Scientific Service (Inc.).*

LIGHTNING FROM A CLEAR SKY, JANUARY 20, 1931

By FRED MYERS

[Weather Bureau, Tatoosh Island, January 20, 1931]

At 4:17 a. m. a flash of lightning was observed overhead and slightly toward the north. The sky was clear with about 2 strato-cumulus clouds along the horizon from the southwest to the northwest. There were six or eight flashes from 4:17 a. m. to 4:32 a. m., no more being observed until 5:15 a. m. when a single flash occurred in about the same location as the others.

Light rain had been falling during the night, ending about 2:45 a. m., the sky clearing by 4 a. m., the stars were shining brightly and the clouds could be seen distinctly in the west. The lightning appeared to flash across the sky and not to the ground. No thunder followed the flashes. This is the first time lightning has occurred from a clear sky at this station as far as can be determined.

The wind was from the south about 23 miles per hour, the temperature 48°; the barometer 30.16 and humidity 92 per cent at 4:45 a. m. (120 meridian time).

[1] This is Table 5 in the original text.
[2] C. Easton. Peterm. Mitt. 1905 and Proceedings Kon. Akad. v. Wetensch. te Amsterdam, 4/5, 5/6, *Bd.* VII, VIII.
[3] Compare *Astronom. Mitt.*, R. Wolf and A. Wolfer. Zurich. A sunspot curve for 1745-1875 by Wilh. Myer is published in Das Weltgebäude, 1898, p. 295.
[4] See MONTHLY WEATHER REVIEW, October, 1930, vol. 58, p. 397, ff.